

Accenture (formerly Andersen Consulting)

Centralized Information System To Improve Nation's Healthcare Delivery

In the early 1990s, the nation's priorities shifted toward a universal healthcare system. This shift drew practitioners' attention to the need to control costs, reduce duplicative testing, transfer medical records easily, and provide quality patient care across a patient's entire life. Critical elements of a new information infrastructure would include an easily transferable medical record, standardized best-practice care paths, and methods of documenting utilization. Healthcare information systems that could provide this kind of information for the U.S. population simply did not exist in 1994. Andersen Consulting submitted a proposal to the Advanced Technology Program (ATP) and was awarded cost-shared funding for a joint venture through ATP's focused program, Information Infrastructure for Healthcare, to develop such an infrastructure. ATP assistance was required because private investors were not confident that this technology, when commercialized, would result in sufficient revenues. By 1997, when the ATP-funded project ended, Andersen Consulting's project had met all of its technical innovation goals. Changes in the healthcare industry, however, made a centralized information infrastructure irrelevant, and commercialization did not take place.

COMPOSITE PERFORMANCE SCORE

(based on a four star rating)

No Stars

Research and data for Status Report 94-04-0025 were collected during January - March 2001.

Processes Limit Efficiency in the Healthcare Industry

Throughout its evolution, the U.S. healthcare industry has not developed information systems capable of handling a universal delivery system. Until 1994, information technology systems operated along enterprise and system boundaries in the healthcare delivery system and were further fragmented by the proprietary business interests of large entities that sought to control patient information.

The application boundaries and the processes assumed by existing applications blocked systems reengineering efforts. In the mid-1990s, as the U.S. healthcare marketplace began to explore methods of granting access to patient information, creating lifelong medical records, and enabling information sharing and systems interoperation, available systems proved incapable of expanding beyond the boundaries of individual practices.

Joint Venture Proposes High-Risk Research and Demonstration

Healthcare providers following the fee-for-service model in 1994 had no incentive to change to an information system that would limit the administration of duplicative medical care. Industry trends, however, suggested that a new type of information system would be needed in the future. Payers, such as the Federal Government's Health Care Financing Administration, which administered the Medicare program, and private insurance providers, were just beginning to scale back reimbursement for medical services to limit redundant care.

Beginning in the mid-1990s, while attempting to negotiate more favorable reimbursement terms from payers, the healthcare industry began to consolidate and control costs by eliminating excess staff and services and by providing comprehensive care under one organization. It was into this environment that

Andersen Consulting proposed to implement the healthcare information infrastructure (HII).

If successful, Andersen Consulting's joint-venture project would adapt as the industry contracted, generating tremendous cost savings to surviving providers; would reduce adverse healthcare outcomes through the use of best-practice care paths; and would increase productivity across the U.S. economy by decreasing time spent receiving medical care. Given the potential benefits to the U.S. healthcare system, and the impact that a successful project could have on the overall productivity of the U.S. workforce (which would spend less time in the doctor's office), Andersen Consulting turned to ATP for funding.

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Because of the healthcare industry's information infrastructure needs, the high technical risk of the proposed project, and the potential for broad-based economic benefits across the U.S. economy, ATP awarded the joint venture \$3.8 million in cost-shared funds to conduct a two-year research and demonstration project of a new healthcare informatics system.

New System To Comprise Six Major Components

The goals of the proposed patient-focused information system were dramatic cost and quality improvements and seamless healthcare delivery.

To meet these goals, the proposed HII system would comprise the following six separate, but interrelated, systems:

- Master Member Locator Service (MMLS): A domain-centric service would maintain the "system address" of every customer medical record via a unique HII identifier and would allow search engines to pull up all necessary data on particular members at any time, anywhere, in much the same way that Internet search engines operate.

- Medical Record Object (MRO): The MMLS would access a "virtual" patient medical record which would approximate the pen-and-paper record. This MRO would operate across disparate computer information system applications throughout the domain.
- MRO Security Service (MSS): A domain-centric service would monitor and control access to consumer health practice data in the MRO form through the use of roles and privileges. This powerful firewall would keep the medical record and all the sensitive data kept therein safe from information thieves.
- Non-Native System (NNS) Adapter: NNS adapters would enable existing health practice systems to engage HII services and extend their market collaboration. The NNS adapter would be the "middleware" that would allow many different types of information systems to access and use the HII.
- Process Server: A healthcare-focused workflow engine would represent and enact local definitions of preventative, chronic, and episodic care protocols on a consumer-specific basis. This server would push care paths to the practitioner, as well as enable internal data mining to monitor treatments, outcomes, and other standards and measures.
- Notification Server: An event monitor and expression logic would deliver appropriate updates to inform practitioners and care-delivery organizations of changes in a patient's care delivery or health status. This server would replace the phone calls or memoranda that practitioners receive with an automated system. This system could, for example, keep a primary care or referring physician apprised of a patient's stay in the hospital.

Andersen Consulting Brings Together Industry Talent

Although Andersen Consulting (currently known as Accenture) was a management consulting firm with global systems integration experience, it needed assistance in accomplishing its ATP project goals due to the extraordinary complexity of developing an integrated healthcare informatics system. Therefore, the company formed a joint-venture team with requirements providers and reviewers, component providers, and end users. Andersen Consulting was responsible for overall project management and systems integration. Many other firms contributed to the joint venture's research, although Andersen Consulting performed much of this research in-house.

The companies in the joint venture included:

Expersoft Corporation This privately held company focused on the emerging market for distributed object management software. The company also offered integrated tools that addressed many of the problems encountered in building and managing distributed information systems in large-scale organizations. Expersoft would provide the software backbone of the system that would enable the MRO.

MedicaLogic, Inc. This company develops, markets, installs, and supports electronic medical record (EMR) software for use in ambulatory care practices. MedicaLogic's computerized clinical records technology was the leading supplier of EMR systems for office-based medical practices at the time that Andersen Consulting proposed this project to ATP. The company would work to ensure that coding of and access to medical records could occur smoothly within the proposed HII system.

Medical Records Corporation (MRC) MRC is a privately held company that is the oldest and largest medical transcription service in the United States. The company has developed proprietary database management and hospital mainframe information systems that have been used throughout the healthcare industry.

Enigma Logic Enigma Logic is a privately held company that pioneered the development of computer security products. Enigma Logic has provided hardware

and software to a variety of users in highly complex computerized and networked environments across large organizations. The company would supply significant expertise to make sure that the proposed information infrastructure would be secure.

Stanford University's Section on Medical Informatics This division within Stanford coordinated the university's medical computing research. In its 20-year history, the Section has developed extensive national medical resources and a series of major medical decision-support and electronic records applications.

Infratechnology Could Generate Spillover

Infratechnologies are sets of technical tools for making an entire economic process more efficient. These tools generate broad-based economic benefits through the efficient processes they enable. Andersen Consulting's joint-venture proposal was designed to create an information technology process that could be shared across the entire healthcare industry, making the industry significantly more efficient. To facilitate this process, the company also pledged to distribute its MRO master member index directory service programs openly and free of charge; the company also said it would invite feedback. By using open distribution, even if the project failed, substantial knowledge spillover would occur throughout the healthcare industry. If the project was successful, the spillover could be significantly greater.

Although the administration costs of the information system itself would be \$25 per year per patient, the system would eliminate enough duplicative care to save \$50 to \$200 per patient per year, as well as enable productivity increases across the economy from less time spent in doctors' offices. In addition to the financial benefits, a successful HII project that pushed care paths to practitioners and reduced time spent on other administrative tasks would generate significant nonmonetary benefits across the economy. These benefits would accrue to the healthcare industry as a whole in the form of additional time available to providers to care for other patients; better care for patients, who would have more time with care providers; and increased profitability for providers and insurers.

The components of the system were distributed freely among healthcare providers in an attempt to coalesce the industry around a single information system standard. The knowledge spillover was intentional, and there were no efforts to limit access to this knowledge through the patent process or secrecy.

Joint Venture Identifies Industry and Technical Goals

Andersen Consulting identified separate industry and technical goals for the information infrastructure system. Two defined industry goals were to demonstrate the utility of an information system that requires less effort to adapt to ever-changing methods of care delivery and to develop support within the industry for this type of cost-control-based information system when the current fee-for-service practices do not reward cost controls. The chief technical goals of the project were to develop the six separate elements of the information infrastructure and to enable these elements to work together in a secure, stable, easily adaptable information system that could be used throughout the healthcare system.

Andersen Consulting proposed that the technical goals would be reached through extensive research, systems design, and troubleshooting-leading to a system-wide product demonstration in 1997. The industry goals would be achieved through the joint venture's commercialization plan after the technical goals were met.

Overcoming Obstacles Leads to Technical Successes

During the project, Andersen Consulting overcame two challenges that threatened its goals of integrating system elements. At the end of the project, however, the integrated delivery system, with its "cradle-to-grave" care hallmark, was not accepted because it did not fit with healthcare practices as they had evolved over the project's life.

One major obstacle that the company encountered was that the backbone MRO software from Expertsoft did not function properly. The MRO software was supposed to provide complete patient medical records that would be accessible to any provider at any location at any time.

After months of delay and attempts to debug Expertsoft's MRO software, Andersen Consulting elected to use Iona's Orbix product instead. Orbix enabled the six diverse elements of the healthcare information system to work together.

The components of the system were distributed freely among healthcare providers in an attempt to coalesce the industry around a single information system standard.

A second obstacle to the project's success was that the joint venture faced barriers to accessing patient data. Much of the existing patient data in the mid-1990s were stored in different forms on proprietary servers, with server owners often unwilling to share access to the data (note that this problem continues even today). To overcome this resistance, Andersen Consulting had to write in substantial amounts of code to translate the existing data into the new information system. This code was added to the NNS architecture in order to make the healthcare information system useful and effective.

Andersen Consulting eventually succeeded in overcoming these technical barriers, and the joint venture conducted a demonstration of the healthcare information system. The demonstration profiled a patient who had just joined a new health system and had selected a new primary care physician. The patient answered questions programmed into an on-line entrance exam. The entrance exam flagged the patient as "at risk for heart disease" and set up appointments for diagnostic tests, steps that were completed before the patient visited the doctor. During the patient's first office visit, the doctor focused on treatment and follow-up care because the routine patient-intake work and diagnostic tests had already been performed. Without Andersen Consulting's healthcare information system, the same process would have required three appointments with the doctor.

Industry Evolution Stifles Commercialization Strategy

In order to generate broad-based economic benefits, the joint venture's proposed HII system would need to

be adopted by care providers. Andersen Consulting developed a commercialization plan to accomplish widespread adoption after completion of the ATP-funded research and product demonstration steps. This commercialization plan was designed to leverage the information system's utility for a fully integrated delivery system. Although the common gateway interface language-based medical record and retrieval program was a bit restricting, its use within an integrated system of somewhat standardized information technology platforms would achieve many of the project's goals.

At the end of the project the integrated delivery system, with its "cradle-to-grave" care hallmark, was not accepted because it did not fit with healthcare practices as they had evolved over the project's life.

By the time the ATP-funded portion of the project ended in 1997, the healthcare industry had undergone dramatic changes. Although consolidation and cost-control efforts had increased dramatically between 1994 and 1997, by early 1998, the trend slowed markedly. At that time, the attempt to forge a universal healthcare system through integrated delivery systems had failed, and the idea was no longer widely discussed. By late 1998, the healthcare industry settled on a hybrid system of partial integration. The move away from a fully integrated delivery system rendered the joint venture's healthcare information system largely irrelevant because it did not fit with healthcare practices as they had evolved over the project's life.

During an interview in early 2001, an Andersen Consulting partner indicated that the company does not expect to generate any revenue from the commercialization of this ATP-funded project's accomplishments.

Conclusion

In the early 1990s, the healthcare industry began to see trends toward consolidation and cost containment as payers such as the Federal Government and private insurers started limiting expenses. Providers who found it extremely difficult to cut costs began paring back services to Medicare and Medicaid recipients. Andersen

Consulting formed a joint venture to create a healthcare information system that could reduce costs and inefficiencies associated with repetitive care and could save money for the healthcare industry and the Federal Government.

The move away from a fully integrated delivery system rendered the joint venture's healthcare information system largely irrelevant.

This ATP-funded joint-venture effort met all of its technical goals and held a successful system demonstration. Shortly after the ATP-funded project ended, however, healthcare industry dynamics changed in a way that prevented successful commercialization.

PROJECT HIGHLIGHTS

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Project Title: Centralized Information System To Improve Nation's Healthcare Delivery (Healthcare Information Infrastructure (HII) for Interoperation of the Healthcare Delivery System)

Project: To develop an open-system architecture and information metastructure to serve as an interface between independent healthcare information systems on the basis of a high-level, patient-oriented data object.

Duration: 4/1/1995-3/31/1997

ATP Number: 94-04-0025

Funding (in thousands):

ATP Final Cost	\$ 3,819	50%
Participant Final Cost	<u>3,821</u>	50%
Total	\$ 7,640	

Accomplishments: This project successfully developed and demonstrated the functionality of a healthcare information system that could control costs, eliminate redundant care, and give health care providers more time with their patients. This healthcare information infrastructure (HII) relied on the following six separate components:

- Master Member Locator Service (MMLS) would allow search engines to pull up all necessary data on particular members at any time, anywhere, much as Internet search engines operate.
- Medical Record Object (MRO) would make up the medical record that the MMLS would access for each patient.
- MRO Security Service (MSS) would act as a powerful firewall to keep the medical record and all the sensitive data kept therein safe from information thieves.
- Non-Native System (NNS) Adapter would be the "middleware" that would allow many different types of information systems to access and use the HII.
- Process Server would push care paths to the practitioner as well as enable internal data mining to monitor treatments, outcomes, and other standards and measures.

- Notification Server would replace the phone calls or memoranda that practitioners receive with an automated system. This system could, for example, keep a primary care or referring physician apprised of a patient's stay in the hospital.

Commercialization Status: Within two years of the conclusion of this ATP-funded project, the healthcare marketplace had changed. Aggressive cost cutting had not proved successful for providers, and a universal approach to healthcare delivery was no longer widely discussed. These market changes minimized the potential impact of the healthcare information system developed by Andersen Consulting's joint venture. The company does not expect to generate any revenue from this project.

Outlook: Given the change in the healthcare marketplace, the impact of this project is now its potential for knowledge spillover to other industries that may undertake similar information system projects in the future.

Composite Performance Score: No stars

Focused Program: Information Infrastructure for Healthcare, 1994

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